

ELECTRICAL DEVICES AND APPLIANCES

Each year the Guam Fire Department responds to a significant number of fires and medical emergencies caused by electrical malfunction. Every year in the United States, more than 1,000 people are killed and thousands more injured in electrical fire or shock incidents. It is important to know how to use electrical appliances safely and how to recognize electrical hazards.

The Nature of Electricity

Most homes have two incoming voltages: 120 volts for lighting and appliance circuits and 240 volts for larger air conditioning and electric dryer circuits.

When an appliance switch is turned on, electrical current flows through the wire, completing the electrical "circuit" and causing the appliance to operate. The amount of flowing current is called "amperage." Most lighting circuits in the home are 15 amp circuits. Most electric dryers and air conditioners require larger 30 amp circuits.

The amount of electrical power needed to make an appliance operate is called "wattage" and is a function of the amount of current flowing through the wire (amperage), and the pressure in the system (voltage).

Mathematically speaking, volts x amps = watts. So, if we have a 120 volt system and a 15 amp current, we can flow a maximum of 120×15 or 1,800 watts on a typical lighting or appliance circuit. When too many lights or appliances are attached to the electrical system, it will overload and overheat. This can cause the wire insulation to melt and ignite, resulting in an electrical fire. Resistance affects the amount of electrical current flowing through wire. This is known as "ohms." Resistance causes increased heat in the wire. Heat is the byproduct that makes some appliances work, such as an iron, toaster, stove or furnace. Large current faces high resistance when moving through a small wire. This generates lots of heat. That's how an incandescent light bulb works. Resistance through the light filament causes it to heat up which gives off a bright light. The length of a wire also affects electrical resistance. Operating an

electrical hedge clipper with a long extension cord increases resistance and might cause the cord to overheat, melt or ignite. The same occurs if too many strands of Christmas lights are connected together.

The size of electrical wire is dependent upon the amount of current required to operate a particular appliance. The thickness of the wire is called gauge. The lower the number gauge the thicker the wire. Wiring to the air conditioner, electric stove and electric dryer is much larger to handle the increased voltage (240) volts) and amperage (30 amps). Wiring is covered with a protective material called "insulation."

Electrical circuits in homes are designed so that all components are compatible. The size of the wire, outlets and circuit breakers are designed for an anticipated electrical load. A circuit is said to be overloaded when too much current flows causing heat build up or wiring to break down. When two bare wires touch, a "short circuit" is said to occur. This can lead to sparks and fire. Deteriorated insulation is one of the most frequent causes of short circuits.

A "circuit breaker" or "fuse" is a safety device designed to prevent accidental overloading of electrical circuits. They are set at a specific amperage. When that amperage is exceeded, it trips and shuts off the flow of electricity, stopping the circuit from continued overheating. When a fuse or circuit breaker trips, it is important to find the cause and correct it. Often, people will just reset the breaker or put in larger fuse. **NEVER USE OVERSIZED FUSES ON CIRCUIT BREAKERS. NEVER SUBSTITUTE A PENNY OR FOIL-WRAPPED FUSE.** This could cause a fire!

General Electrical Safety

When a house is under construction, building inspectors visit to make sure the electrical system is in compliance with the Building Code and the National Electrical Code. Only licensed electricians are permitted to install electrical systems. During home remodeling, when electrical circuits are added or changed, make sure to use a licensed electrician whose work complies with the electrical code. Add enough outlets in every room to avoid using multiple plugs or extension cords. Use a ground fault circuit interrupter (G.F.C.I.) or (G.F.I.) on circuits in the

bathroom, or outdoors where water or moisture is present. G.F.I. is a type of very sensitive circuit breaker and is required by the Building Code.

When choosing an electrical appliance, be sure a safety-testing laboratory approves it. This insures that it has been constructed in accordance with nationally accepted electrical standards and has been evaluated for safety. Use the appliance only according to manufacturer's specific instructions.

If you touch an electrical appliance, wall switch or electrical cord while you are wet or standing in water, it will increase the chance of electrical shock.

When using an extension cord, be sure it is designed to carry the intended load. Most cannot carry as much current as permanent wiring and tend to overheat. Do not use an extension cord in place of permanent wiring, especially if a tripping hazard exists or where there is high physical abuse, such as under a carpet. Keep electrical cords away from infants and toddlers and use tamperproof inserts on wall outlets to prevent them from sticking objects into the outlets. The cord must be protected from damage. Do not run it around objects or hang on a nail. Inspect it periodically for worn insulation and overall condition.

Safety with Electrical Appliances

The potential for electrical shock or fire from an electrical appliance is very real, especially when safety recommendations are not followed.

Before buying an appliance, look for the label of a recognized testing laboratory such as Underwriters Laboratory or Factory Mutual.

Keep hair dryers, curling irons, toasters, stoves, irons and other heat-producing appliances away from furniture, curtains, bedding or towels. Also, give televisions, stereos and computers plenty of air space so they won't overheat.

Never use an appliance with a damaged cord, and be sure to use three-pronged electrical devices in three-pronged outlets. These outlets may not be available in older homes, so use a

three-pronged adapter, and screw the tab onto the grounded outlet box cover. Never cut off or bend the grounding pin of the plug. If you have a polarized plug (with one side wider than the other), never file it down or try to make it reversible.

Keep electrical cords out of the path of traffic. If you put cords under carpets or rugs, wires can be damaged and might result in fire.

An electrical cord should never be wrapped around an appliance until the appliance has cooled. Because hair care equipment is often used in bathrooms near sinks and bathtubs, it is extremely important to be especially careful that the appliances do not come in contact with water. If one drops into water, do not touch it until you have pulled the wall plug.

Protect young children by putting plastic inserts in receptacle outlets not in use to keep them from putting anything into outlets.

Never put a kitchen knife or other metal object in a toaster to remove stuck bread or bagels unless it is unplugged and cooled. Install television and radio antennas where they cannot fall across power lines. Use caution when operating a tree-pruning device or using a metal ladder around power lines.

Inspect appliances regularly to make sure they operate properly. If an appliance smells funny when in use, makes unusual sounds or the cord feels warm to touch, repair or replace the unit. Don't repair it yourself unless you are qualified. Keep appliances in a cool, dry place to prevent rusting.

Electrical Emergencies

When an electrical emergency occurs, there are several survival actions that can be taken. You should know how to trip the main circuit breaker at the electrical panel to turn off all power to the house.

If an appliance smells funny or operates improperly, pull the plug if it can be done safely. If arcing, burning or smoking from an appliance occurs, turn off the power at the circuit breaker and CALL THE FIRE DEPARTMENT.

Winds accompanying typhoons and thunderstorms may knock down power lines or utility poles. Keep people away from the area, and call the fire department. If power lines come in contact with a vehicle, do not touch it or the vehicle. If people are inside, tell them to stay inside. If they try to exit, they may complete a grounded electrical circuit and be instantly killed. They must stay inside until the utility company shuts the power.

If a serious electrical malfunction occurs in your home, school or workplace, it is the same as a fire. Notify others, activate the fire alarm and exit promptly. If you are familiar with the operation of a fire extinguisher, you can use only a "Class C" Fire Extinguisher on an electrical fire.